AD-A283 138

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

...ion is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, ...leting and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this ...ducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson ...and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

2. REPORT DATE May 1993	3. REPORT TYPE AND DATES COVERED FINAL
4. TITLE AND SUBTITLE Strategic Airlift is Air Power	5. FUNDING NUMBERS
6. AUTHOR(S) Mary T. Bonnet, GS-14, USAF	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) AIR WAR COLLEGE 325 CHENNAULT CIRCLE MAXWELL AFB AL 36112-6427	8. PERFORMING ORGANIZATION REPORT NUMBER Unnumbered AWC research paper
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A	10. SPONSORING/MONITORING AGENCY REPORT NUMBER N/A

11. SUPPLEMENTARY NOTES
PAPER IS WRITTEN TO FULFILL ACADEMIC RESEARCH REQUIREMNTS FOR AN IN-RESIDENCE SENIOR SERVICE PROFESSIONAL MILITARY SCHOOL.

12a. DISTRIBUTION / AVAILABILITY STATEMENT APPROVED FOR PUBLIC RELEASE; DISTRIBUTION IS UNLIMITED	12b. DISTRIBUTION CODE

13. ABSTRACT (*Maximum 200 words*)
See page iii

14. SUBJECT TERMS Strategic, Airlift, Air Power	15. NUMBER OF PAGES 32
	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
UNCLAS	UNCLAS	UNCLAS	UL

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. Z39-18
298-102

Jcs 4 May
7 AK 5 May

AIR WAR COLLEGE

AIR UNIVERSITY

STRATEGIC AIRLIFT IS AIR POWER

by

Mary T. Bonnet

GS-14, USAF

A RESEARCH REPORT SUBMITTED TO THE FACULTY

IN

FULFILLMENT OF THE CURRICULUM

REQUIREMENT

Advisor: Colonel Louis S. Taylor

MAXWELL AIR FORCE BASE, ALABAMA

May 1993

DISCLAIMER

This study represents the views of the author and does not necessarily reflect the official opinion of the Air War College or the Department of the Air Force. In accordance with Air Force Regulation 110-8, it is not copyrighted, but is the property of the United States government.

Loan copies of this document may be obtained through the interlibrary loan desk of Air University Library, Maxwell Air Force Base, Alabama 36112-5564 (telephone (205) 953-7223 or DSN 493-7223).

ABSTRACT

TITLE: Strategic Airlift is Air Power

AUTHOR: Mrs. Mary T. Bonnet, GS-14, USAF Civilian

Strategic airlift is a key component of air power in that it enables the Department of Defense to rapidly deploy and employ combat power in support of national objectives. Our experience in the Gulf War, where in a seven-month period, we airlifted over a half-million short tons of cargo and almost a half-million passengers into the theater of operations, showed clearly that strategic airlift is a system. It is a system so capable that it enabled the United States and its allies to deliver to the Gulf ten times the daily ton-miles as the 1947-48 Berlin Airlift and four times that of the 1973 airlift to Israel. However, the Gulf War airlift was far from flawless. It generated some unique and challenging situations that highlighted shortcomings in what is first and foremost a system. Fixing any system requires an understanding of how each component works and an appreciation for the relationship between each component and the system. Given the downsizing of the US military and in light of ongoing fundamental changes in the world political situation, reviewing the state of our airlift system is essential. The result of such a review must be to ensure that the United States possesses the strategic airlift capable of rapidly projecting combat power wherever and whenever necessary.

BIOGRAPHICAL SKETCH

Mrs. Mary T. Bonnet (B.A. in Mathematics, College of Saint Elizabeth and M.Ed. in Research Methods and Statistics, Georgia State University) is a GS-14 Operations Research Systems Analyst with a background in developmental and operational testing. She has been interested in strategic mobility since transferring to the Air Force Studies and Analyses Agency from Headquarters, US Army Deputy Chief of Staff for Operations in 1989. Since then, Mrs. Bonnet has been either a team member or directed teams that conduct mobility and force effectiveness studies supporting Secretary of the Air Force and Air Force Chief of Staff initiatives. She is a graduate of the Air Command and Staff College class of 1990 and the Air War College class of 1993.

TABLE OF CONTENTS

CHAPTER I

INTRODUCTION

Strategic airlift is a key component of air power in that it enables the Department of Defense (DOD) to rapidly deploy and employ combat power in support of national objectives. In light of global political transformations, military force reductions, budgetary constraints and reorganization, and the experience gained in the Gulf War, the status of strategic airlift must be reviewed. The desired outcome of such a review is to ensure the United States (US) possesses an airlift fleet capable of projecting combat power as required.

The intent of this paper is to provide the reader with an understanding of the critical importance of the continued development and review of strategic airlift policies, practices and capabilities in light of current and future military (and humanitarian) roles. The Air Force must meet current and future security needs. If the strategic airlift system is inadequate, we will not have adequate air power and combat power when and where needed. With less forward basing and reduced force structure, strategic airlift could well be the critical component that spells the difference between success and failure in future contingencies.

"The world of the 1990s and beyond is likely to be characterized by a combination of political instability, serious economic dislocation, and widespread military power." (1:1) The United State's new defense orientation is primarily toward regional contingency or localized conflict. This orientation requires the ability to respond quickly and effectively to unpredictable challenges to US interests. Potential challengers could possess modern sophisticated weapon systems. "Future US forces will meet the challenge through increased flexibility in planning, training, and employment, ***provided they have the capability to deploy to an area of potential crisis in sufficient time, with a proper mix of combat and support forces.***" (emphasis added) (10:ES-1)

> The uncertain and dangerous future world will require more capability than the United States possesses today to project a powerful force quickly to overseas crisis areas...Our forward presence is declining, the number of potential crisis flash points is increasing, and future coalitions could be *ad hoc*. To support national interests, deployment capability must increase...(10:ES-2)

This paper presents ideas gathered from a number of recent studies that highlight areas of research and concern in the strategic airlift arena. It will examine several studies of the military airlift force and the Civil Reserve Airlift Fleet (CRAF). Following that, it will look at airlift modernization and finish with a discussion of how analysis can assist in efforts to improve the overall airlift system. The reader will see there are many important areas which require improvement.

CHAPTER II

BACKGROUND

Although airlift, sealift, and prepositioning make up the mobility triad, sealift and prepositioning are not addressed in this paper. These two components are absolutely essential to the mobility system and need improvements in their own right. However, the remaining leg of the mobility triad, strategic airlift, is critical to the mobility system as it moves the preponderance of forces and equipment into a theater of operations during the earliest stages of a contingency. Regardless of the phase of an operation, when time is critical, airlift becomes the key component that provides the speed and flexibility to respond adequately. A recent example was the airlift of XVIIIth Airborne Corps elements into Saudi Arabia during the first days of Operation Desert Shield, before heavy armored forces could be delivered by sealift.

> In this dynamic, fast-paced world, one of the most precious commodities is time. Time is distance -- time is strategy -- time is the ability to respond to an immediate crisis. The ability of the United States to deter aggression, limit conflict, or wage war successfully depends on the ability to deploy, employ, and sustain its fighting forces in a timely manner. (5:4)

Airlift is composed of both military and civilian aircraft. Although military and civil airlift have been linked for approxi-

mately 60 years, the Civil Reserve Airlift Fleet (CRAF) program did not come into being until 1952. (9:434) CRAF augments US military airlift forces with civil air carriers to support emergency airlift requirements. When airlift requirements exceed the Air Mobility Command's (AMC)* capabilities, civilian air carriers provide cargo and passenger aircraft to support airlift requirements. (13:1) The CRAF is committed in three stages: **Stage I** is called **Committed Expansion**. The Commander in Chief, Transportation Command (CINC TRANSCOM) has authority to make this activation. When Stage I is activated, 3 million ton miles per day (MTM/D) of cargo and 13.2 million passenger miles per day (MPM/D) are available within 24 hours. **Stage II** is called **Airlift Emergency**. The Secretary of Defense (SECDEF) activates this stage which provides additional airlift for a major emergency that does not require national mobilization. An additional 2 MTM/D of cargo and 33.8 MPM/D of passenger capacity are available again within 24 hours. **Stage III** is called **National Emergency**. The SECDEF activates this stage after a national emergency is declared by the President or Congress. It provides an additional 335 aircraft consisting of 12.5 MTM/D of cargo and 108 MPM/D of passenger capability within 48 hours. Also, when Stage III is activated, aeromedical evacuation aircraft become available to augment organic capability. (14:12,13; 2:7,8)

---

* The Military Airlift Command (MAC) became Air Mobility Command (AMC) in June 1992. From this point forward, AMC will be used in this paper unless the old name for the command, MAC, is more appropriate based on the timeframe, or is used in a direct quote from the reference.

The addition of CRAF provides a surge capability for the government. Today the relationship between DOD and the CRAF is basically a partnership. There are certain types of cargo, such as outsize cargo, which can only be delivered by military airlift. There are certain missions and occasions when military airlift is the only appropriate means of delivery, such as when secrecy of intent is paramount. However, fiscal constraints limit procurement of sufficient military aircraft to fully meet the military's needs. CRAF is meant to cover this airlift shortfall. The 1981 Congressionally Mandated Mobility Study (CMMS) analyzed US strategic cargo airlift requirements in terms of MTM/D. Based on scenarios, requirements varied from 73 to 125 MTM/D. Limited by fiscal constraints, the CMMS planners established an airlift goal of 66 MTM/D, which was the benchmark used to assess airlift capability for many years. Today, the combination of military and CRAF provides only 48 MTM/D. Also, reducing the C-17 purchase from 210 to 120 aircraft precludes meeting the 66 MTM/D goal. (2:5)

Voluntary participation is an important aspect of the CRAF program. TRANSCOM provides incentives to civil carriers for their participation. The greater a company's participation in CRAF, the higher priority it receives for peacetime military airlift contracts. This is a substantial contract since civilian carriers provide 95 percent of peace-time military passenger movement. (2:8) CRAF assets, when activated during a crisis, are under AMC "mission control", while the civil carriers retain "operational control" of the individual aircraft. This means

that AMC directs the cargo load, departure and destination points while the civil carriers direct all supporting requirements. (2:8,9)

CHAPTER III

MILITARY AIRLIFT

Mobility Requirements Study (MRS)

"Congress tasked the Department of Defense to determine future mobility requirements for the Armed Forces and to develop an integrated mobility plan. (Section 909 National Defense Authorization Act for Fiscal Year (FY) 1991)" (11:ES-1) In order to provide the information requested, DOD conducted the Mobility Requirements Study (MRS) "which studied, analyzed, compared, and revised many different conflict scenarios and mobility plans" and produced an integrated mobility plan which provides "the best balance among requirements, confidence in achieving mobility goals, and costs." (11:ES-6) There are threats to US interests in the world, even though determining where and when a given threat will arise is problematic. Some of these could "require fast, effective fighting forces capable of fulfilling diverse missions" in areas where "adequate pre-positioned equipment or bases may not be available and where the capability to support the force once it has arrived is limited." (10:ES-2)

Based on the conduct and analysis of over 90 separate war games, amphibious lift combined with the direct delivery capability of the C-17 significantly improved US success in the Southeast Asia and Western Hemisphere scenarios. To meet the to-

tal mobility requirement, the Integrated Mobility plan recommended the C-17 program continue in order to improve the airlift component of strategic mobility. (10:ES-3 - ES-6)

A concurrent sequential mobility analysis was conducted in the MRS using first Major Regional Contingency (MRC) East and later MRC West. The projected FY 1999 mobility assets were unable to deliver the force based on the required schedule. There were shortfalls in the delivery of unit equipment to both theaters during the early delivery periods, and in the ability to maintain the required flow of resupply and ammunition to both. (11:ES-1)

An analysis was done on the impact of lost infrastructure, such as base closures, on the ability to deliver forces to a theater of operations. Lack of infrastructure and its associated resources will limit mobility throughput. Tankers, airlifters, fighters, bombers and local national force beddowns compete for the same, often limited, ramp space. (12:V-3) Some bases in Europe and elsewhere are scheduled to close which will also adversely affect the arrival rate of forces. For example, the 30 day requirement for closure for the MRS MRC East scenario that now takes 39 days will require 71 days if the Rhein Main, Torrejon and Lajes airbases are closed. The current peacetime capacity to service Central Europe is also degraded. (11:ES-2)

Another important consideration is the logistics resource base including deployed maintenance, spare parts, and refueling operations at all but offload locations. At theater offload locations, the concept is to minimize time on the ground and fly

away, without refueling, to a nearby recovery location. Although the MRS analysis included a recovery location, none existed during the Gulf War. Materials handling equipment (MHE) for loading and offloading aircraft must be in place or arrive with the first aircraft. Crew rest and command and control facilities are absolutely essential for coordinating mission activities and allocating resources. (12:V-3)

"Throughput and closure are primarily a function of both distance and support infrastructure. The farther one must deploy and the less robust the support infrastructure, the lower the throughput becomes and the longer it takes to close forces." (12:V-5) Where there is a lack of infrastructure, as in Central America, even short distances can pose problems and limit delivery capability.

Today's airlift fleet can deliver about 4750 tons per day (T/D) to South West Asia, closing the MRC East scenario force in 39 days to 53 days if Operation Desert Shield activity levels and assumptions are applied. If the airbases at Lajes, Rhein Main and Torrejon are closed, that capacity is reduced to 3375 T/D and takes 55 to 74 days to deliver the same amount of personnel and material. (12:V-7) Tanker operations would also be affected, as well as the closing time for fighters. Some fighter closure problems can be resolved by additional tankers, but this in turn dramatically impacts on airlift operations. Depending on the direction of flow of the fighters, airlift deliveries can drop by 1600 to 2100 T/D below the base case of 4750 T/D. (12:V-11)

Peacetime operations are also affected by the closure of these bases. As an example, Rhein Main processes an average daily throughput of about 160 T/D, while Ramstein handles about 125 T/D. Without Rhein Main, there is a shortfall of approximately 117 T/D. (12:V-15)

Gulf War Airlift Lessons Learned

There are several Rand studies on Operations Desert Shield and Desert Storm (DS-DS). The study used here focuses on how well the strategic airlift system performed, why the system did well or poorly in certain areas, and implications for the future. (7:iii)

> When President Bush decided to deploy American combat forces to the Gulf on 7 August 1990, he launched the greatest airlift in history. In the next seven months, the Military Airlift Command (MAC) would airlift to the Gulf over a half-million short tons of cargo and almost a half-million passengers. This operation moved 10 times the daily ton-miles of the 1947-48 Berlin airlift and 4 times that of the 1973 airlift to Israel. Unlike those previous, primarily logistic airlifts, Operation Desert Shield marked the first major strategic deployment of combat units by air. In the first 30 days of the airlift, MAC transported equipment and personnel for several hundred combat aircraft, the 82nd Airborne Division, elements of the 101st Airborne Division (Air Assault), a Marine Air-Ground Task Force, plus headquarters and support units. (7:v)

This extraordinary airlift operation was very successful, but in many ways the strategic airlift system did not appear to attain its expected performance level. Daily throughput fell below Central Command's (CENTCOM) expectations with utilization rates a third to a half below planned levels. The percent of

aircraft available for the C-5 was 67 percent and 81 percent for the C-141. Average payloads were 12 to 40 percent below planning factors. These shortfalls suggest that either the capabilities are overestimated or there are problems in operational efficiency. The study concludes that a variety of factors precluded optimal performance of the airlift system with some factors within MAC's control, but most not. Four problem areas were identified: planning, aircrew availability, aerial ports, and aircraft performance. (7:v)

"Operation Desert Shield began without an operational plan or feasible transportation plan."* Requirements were defined as the deployment developed and changed frequently as the operational situation evolved making it difficult to make efficient use of the airlift fleet. Frequent changes made to the requirements made it difficult for the automated database processors and procedures to keep up. There were people outside MAC building plans and preparing loads who did not understand underlying planning factor assumptions. This led to some of the apparent shortfalls in capability. (7:v-vi)

Roughly half of AMC's strategic aircrews are in the reserves. Utilization rates assume all these aircrews are available. However, the callup of reserves was not authorized by the President until 16 days into the deployment, and then only partially. Full use of the fleet was hampered by the late and in-

* CENTCOM had been in the process of revising the old operational plan for the region, and its transportation plan, at the time Iraq invaded Kuwait. Since it normally takes about a year to computerize the airlift and sealift for a completed plan, the only alternative was to schedule lift by hand.

complete callup of reserve crews. The lack of a base for crew rest in the theater aggravated the crew shortage problem. MAC augmented crews with three versus two pilots for the Europe-theater-Europe leg of the mission, with 24 hour crew duty days being typical. "The lack of a staging base at a time when air-crews were scarce could by itself explain a 20 to 25 percent shortfall in system performance." (7:vi)

There were various problems at onload, offload, and en route bases. Most deploying units could not prepare cargo within the time assumed in planning factors, especially when airlifters arrived at a rate of more than one per hour. Therefore many missions were delayed or postponed, reducing the utilization rate of the fleet. The entire system was highly sensitive to disruptions, such as weather, air traffic control, or ramp congestion due to the relatively few en route bases capable of handling the airflow. The busiest en route bases -- Torrejon, Rhein Main, and Zaragoza -- handled 61 percent of the airflow. As the MRS study indicated, all three are scheduled to close in the next few years and those closures will greatly affect the airlift flow. Offloads were restricted primarily to one base, Dhahran International Airport. This constrained the throughput and increased the sensitivity of the entire operation to problems, such as limitations in the fuel system, ramp space constraints, and breakdown in MHE. Old MHE at both onload and offload bases was unreliable, resulting in delays or limiting throughput. (7:vi-vii)

"On average, every Desert Shield mission was delayed 10.5 hours." The C-5's average unavailable rate was 33 percent, with 18 percent due to maintenance problems, and an average delay per mission of 9.0 hours for the available aircraft due to logistics. There were times when the C-5 fleet could not meet the demand for outsize cargo capability. The C-141's maintenance record was better, but its average payload was 26 percent below planning factors. "Concerns about fatigue in the inner-outer wing joint of the aircraft resulted in load weight restrictions." (7:vii)

> The experience of Desert Shield highlights some key issues for the future. The C-141 is approaching the end of its service life. If the nation wishes to retain the capability to support a deployment of the scale of Desert Shield, it must modernize its airlift fleet. The C-17, if it meets contract specifications, would fulfill that requirement and offer substantially more capability. We estimate that with the 120 C-17s replacing 265 C-141s, the fleet could have deployed at least 30 percent more cargo in the same amount of time as in Desert Shield. It would also have been able to provide enough outsize cargo capability to meet any conceivable demand. Modernization of material handling equipment with the procurement of 60K loaders will offer significantly greater reliability and flexibility.
>
> Airlift is a system, and for the system to function efficiently its components must each work well and be kept in balance. The recommendations of this study reflect this fact. We recommend that:
>
> - Contingency planning incorporate knowledgeable transporters into the process early to ensure the feasibility of courses of action.
> - Planning also consider how to redeploy forces rapidly and effectively if necessary.
> - Planning factors be reexamined and explained to the users better.
> - Expectations of optimal performance be lowered, for planning purposes, in order to be more realistic.
> - Base operations receive continued attention. The United States needs to ensure access to adequate bases en route and in theater to support contingencies. Every unit and base should have transportation feasibility plans and a single identified point of contact for mobility opera-

tions. Planning should take into account increased communications capacity.

- The Air Force continue funding modernization of material handling equipment.
- The Defense Department strive to ensure that the US Transportation Command or AMC has sufficient aircrews in a crisis. Consideration should be given to granting Commander, AMC limited authority to callup airlift personnel in a transportation emergency, as can now be done with Stage I of the Civil Reserve Air Fleet.
- Airlift modernization to replace the aging C-141 take place. This modernization is essential to maintain the capability to mount an operation of this scale. The experience of Operation Desert Shield and Desert Storm also suggest that the existing fleet may not be able to supply sufficient outsize cargo capability. The C-17 should be able to address both these problems, as well as providing greater throughput when airbase access is limited. (7:vii-viii)

CHAPTER IV

CIVIL RESERVE AIR FLEET (CRAF)

Mobility Requirements Study (MRS)

CRAF played an important role in the Gulf War and was modeled in the MRS. The MRS scenario analysis identified speed in reacting to intelligence indications of aggression as a critical factor, and the early employment of CRAF as an important element of timely support. (10:ES-2) An analysis of anticipated changes to the CRAF fleet was done and the affect on delivery of cargo and passengers was considered minor. (12:II-1 - II-2) Volume I recommended the addition of 20 wide bodied passenger aircraft to transport soldiers to locations where the prepositioned combat and combat support material is stored. Other possibilities to fulfill this requirement are the partial callup of CRAF Stage III, different CRAF activation schedules, or additional military aircraft. (11:ES-2, II-4)

Several years ago an aeromedical shortfall was identified. The revised CRAF contract is supposed to contain aeromedical aircraft in Stage I, but nothing additional in Stages II or III. If so, there would still be an aeromedical airlift shortfall. The airline industry is expected to commit more than the currently offered 13 aircraft. However, if more are not available, C-141s would have to augment the force, which takes away from cargo

movement. For example, the loss could be 24-36 T/D for the concurrent/sequential scenario. (11:ES-1 - ES-2; 12:II-2,II-4)

Gulf War Lessons Learned

On 17 August 1990, CRAF was activated, for the first time, to support Operation Desert Shield. Civilian carriers responded rapidly to Stage I activation by providing 17 passenger and 21 cargo aircraft to the military. Stage II was activated on 16 January 1991, to provide a "massive and urgent sustainment" for Operation Desert Storm. US civil carriers provided a total of 117 aircraft for the entire DS-DS period. They transported almost 400,000 personnel or 80 percent of all passengers and 95,000 tons of cargo or 17 percent of the total airlifted cargo. (2:10) However, as successful as CRAF performance was, some key issues surfaced.

In Operation Desert Shield, MAC experienced an airlift cargo shortfall. CRAF Stage I provided primarily passenger aircraft that were not convertible to cargo haulers, while severe fluctuations in passenger and cargo demands exacerbated the situation. To compensate for these fluctuations, MAC dedicated a number of versatile C-141 aircraft to passenger service. Additionally, because CRAF aeromedical capability was not available until Stage III, some C-141s were set aside for this purpose. These two adjustments reduced the number of aircraft dedicated to cargo movement. Had convertible aircraft been available from the outset, or flexibility been built into the

system regarding the types of aircraft to be made available, a more efficient use of airlift resources might have overcome or even precluded the cargo backlog. (2:13,14)

MAC has typically favored large aircraft to maximize MTM/D. Yet narrow body aircraft can land on shorter fields, and do not need sophisticated ground handling equipment. This capability increases the number of airfields open to aircraft, which in turn, eases airfield saturation problems. However, the majority of these smaller aircraft do not become available until CRAF Stage III. (Bash:13,14) This is an important consideration for movement into areas that have limited airfields in terms of numbers and size.

One study recommended:

> a. The categories of aircraft need to be expanded to include: long-range international, passenger; short-range international, passenger; long-range international, cargo; short-range international, cargo; long-range aeromedical and short-range aeromedical; Continental United States, and Alaskan.
>
> b. Actual values awarded carriers for volunteering specific types of aircraft should be based on the airlift requirements for each category.
>
> c. MAC should formally incorporate volunteer aircraft into a revised CRAF structure and select them before formal activation of the committed aircraft within each segment.
>
> d. If additional capability is needed beyond that volunteered, then MAC should select the aircraft needed by category.
>
> e. MAC should also deactivate specific CRAF aircraft when they are no longer needed. Use a lottery for the selection or deactivation of aircraft.

f. TRANSCOM should have authority to call up the first 15 percent of capability within each segment. (13:30,31)

A more flexible system of CRAF allocation would benefit DOD as well as the airlines. Using what is needed, when it is needed, is better than the frustration of having excess capability that cannot be fully utilized, or worse, lacking an otherwise available capability that is needed.

Another major concern is the senior lodger system which is the basis for CRAF management, maintenance, and logistical support, but only during Stage III. Up until Stage III, civil carriers provide flight crews, parts, maintenance, and fuel. Under the senior lodger concept, a single civil air carrier is designated as executive agent at various locations in the US and around the world. This carrier supports CRAF aircraft in terms of maintenance, fuel, etc., when they transit through a senior lodger destination. (2:8) However, there are locations, such as the Arabian Peninsula and Eastern European countries, that have no senior lodgers. At any given time, there may be too many aircraft in the flow for one civil carrier to handle. Senior lodgers can be confronted with vexing maintenance challenges. There are 29 different types of CRAF aircraft from seven different manufacturers in the CRAF program, and there is often a shortage of MHE at both departure and destination airbases. During DS-DS this situation resulted in greatly increased ground time, and reduced utilization rates. An additional concern is that the contract proposals do not solve the coverage problem generated by

the currently unpredictable international security situation. (2:11,12)

Integrating the relatively small CRAF force into the Desert Shield airlift flow was difficult. Working with over 300 military aircraft, the airlift system could not absorb CRAF capability quickly. Short lead times caused scheduling difficulties for both the military and civilian planners. As a result, airbases became saturated which backed up the airlift system. MAC had to stop the airlift flow for a day or so to clear up the system. (2:15,16) One recommendation is to increase AMC and theater commander involvement in CRAF contingency planning and management. Initiatives such as training for CRAF activations, relaxed CRAF response times (72 hours for Stage I; 48 hours for Stage II), and foreign involvement could reduce the saturation of the airlift system in a future contingency. (2:24,25)

Apart from the equipment shortages due to logistics, CRAF carriers also experienced operational equipment deficiencies during the Gulf War. Airlines do not have a military Identification, Friend or Foe (IFF) system to protect them from mistaken identity. If air combat had expanded, the civil aircraft and their crews could have been endangered. There was no personal chemical protective equipment or training available for the airline crews. One airline purchased chemical gear for its crews from the civilian market. Eventually, MAC put equipment at high threat airports, but since the CRAF crews were not trained in their use and the equipment was not individually sized, the effectiveness of this action was questionable. (2:17) The

purchase of military IFF equipment and chemical equipment for CRAF, and the storage of that equipment at a central location for ease of maintainability needs to be considered. AMC would also have to provide chemical equipment training and war time safe passage training to a cadre of CRAF instructors, who would then train their own volunteer pilots. (2:25)

There are some operational issues that theater commanders need to resolve. CRAF assets are civilian and the crews are neither trained for, nor the equipment designed for use in austere environments or contingency conditions. Potential civilian CRAF losses could have political consequences. Civilian crews are not trained to operate in a combat environment. They do not know how to use chemical gear and secure communications, nor are they familiar with electronic warfare effects in a hostile environment. Also, the theater commander does not have the legal authority to direct civilian crews. For example, during DS-DS, CRAF crews were not permitted to exceed the crew day, nor was the theater commander able to direct deviations. Finally, without a military IFF system, the theater commander will either have to be prepared to accept CRAF losses, or restrict the aircraft and lose flexibility. (2:18-20)

There are other problems. CRAF contracts specify that carriers will provide four full crews (excluding reservists and foreign nationals) for every activated aircraft. AMC lacks the information to determine if carriers will be able to meet these requirements. One concern is that reservists may be double counted, that is, counted as members of the civilian airline

crews and as members of their National Guard or Reserve units that could deploy in the event of a conflict. AMC must reevaluate the four crews per aircraft requirement. Upon verification of the crew requirement, all participating carriers need to submit detailed crew-level information, such as citizenship (only US members are allowed to participate), and reserve-commitment information and keep this information updated on a regular basis. (13:31,32)

CHAPTER V

AIRLIFT MODERNIZATION

C-17 Issues

In the previous two sections, some of the lessons learned from the Gulf War were presented. MAC issued a pamphlet in 1991 that provides insight into how some of the capabilities of the C-17 could have been utilized in that war. The C-17 provides higher throughput than current airlifters. Throughput is how much cargo can be delivered in a given period of time. Therefore, it determines the speed at which the force can be delivered, and how well equipped the force will be throughout the operation. This is important since rapid deployment of a credible force may deter aggression. The C-17 delivers more tons of combat capability per square foot of ramp space, and does it faster than present airlifters. In short, our forces would be better equipped early on, and that can mean fewer American lives lost in the event of a conflict. Having the C-17 will mean fewer intertheater missions and intratheater missions, fewer crew members, faster rate of cargo delivery, and less maintenance. (4:2-3)

According to the pamphlet, in the critical first 12 days of Operation Desert Shield, 80 C-17s could have delivered approximately 50 percent more combat forces than the 117 C-141s that

were used. Examples of additional capability that could have been available are:

3 F-15 squadrons		10 F-15 squadrons		One Light
3 F-16 squadrons	*OR*	10 F-16 squadrons	*OR*	Infantry
3 F-4 squadrons		10 F-4 squadrons		Division
3 A-10 squadrons		10 A-10 squadrons		
2 Light Infantry Brigades				

It took 45 days to deliver all the troops, supplies and equipment called for in the initial phase of Operation Desert Shield. Closure would have occurred ten days earlier, or the C-17 could have delivered more combat power in the same timeframe. How much more power?

20 F-15 squadrons		5 F-15 squadrons
20 F-16 squadrons	*OR*	5 F-16 squadrons
10 F-4 squadrons		5 F-4 squadrons
10 A-10 squadrons		5 A-10 squadrons
One Light Infantry Division		One Armored Cavalry Regiment

(4:4-5)

As mentioned earlier in this paper, ramp space is a crucial resource needed by combat aircraft, airlifters and tankers. If one out of every five C-17 missions from the Continental United States to the Gulf War made just a single intratheater airlift run after offloading, it would replace the capability of 16 C-130s. That would free ramp space for 90 F-16s, or 54 F-15s or 26 F-111s. (4:6) Because of superior turning radius and ability to back, eight C-17s can be parked and offloaded in the space of three C-5s. One C-17 can deliver the payload of two C-141s, or outsize cargo the C-141 cannot deliver, in the same amount of ramp space as a single C-141. Using the C-17 in the future will

allow a greater mix of combat power on the given ramp space, which is what the theater commander needs. (4:7-8)

Many studies have been conducted over the past few years regarding the right mix of airlifters (C-17s, C-5s, C-141s). Just as the above pamphlet information indicated, the C-17 always comes out a winner. Given that kind of improvement, emphasis needs to be placed on continuing the procurement of the C-17s based on the current funding profile, and as OPLANS and scenarios are refined, the outyear strategic airlift profiles need to be revalidated.

Civil-Military Compatibility

Air Force Studies and Analyses Agency (AFSAA) has studied ways to make aircraft modernization more affordable by pursuing increased civil-military compatibility. Options included civil carriers operating military aircraft or the military operating civil aircraft. Alternative strategies for financing the acquisition of airlift resources could also be considered. (6:2)

Civilian use of the C-17 appears to be an ideal solution. The civilian airlines could haul the same types of cargo and use the same types of MHE as their military counterparts. These aircraft could provide militarily compatible capability during a contingency; but, the majority of peacetime costs would be borne by commercial industry. (6:2,3) The airlines surveyed, while not receptive to the idea of owning or operating C-17s, were very interested in the concept of enhancing the civil-military partner-

ship. They believed the concept would be much more successful if the military were to incorporate a civil type aircraft into its inventory. They pointed to the KC-10 as a successful example of this concept. The best approach for the future might be one that combines modernizing with the C-17 and a civil aircraft. (6:3)

There could be several advantages to using civil freighters. The government would have the opportunity to help design a CRAF cargo fleet that is composed of aircraft with like capabilities and configurations. This would ease some of the difficulties associated with load planning, aircraft scheduling, and MHE incompatibilities during contingencies. (6:3,4) Sharing crews could be beneficial. As mentioned earlier, there are issues surrounding civilian crews flying into the theater of operations. In DS-DS, military crews were in short supply because they were exceeding their maximum flying hour restrictions. If military crews operated the same type of aircraft as their civilian counterparts, a crew staging concept could be developed which would address both of these problems. Civil crews could fly CRAF aircraft from a given location to a staging location near the theater of operations. Then, military crews could fly the aircraft to the offload location and return it to the staging location and the civilian crew. Therefore, civil crews avoid the theater of operation and military crews are not flying missions their civil counterparts can perform. (6:3,4)

CHAPTER VI

MODELING AIRLIFT AND RELATED AREAS

Measures Of Effectiveness (MOE) And Combat Capability

In 1990, AFSAA studied developing alternative measures of effectiveness for airlift. (3:I-3 - I-16) The existing MOE, MTM/D, incorporates weight, distance, and time to distinguish different aircraft and fleet capabilities. MTM/D best answers capacity questions. However, it tends to mask some very important characteristics of airlift, such as throughput constraints, ramp space, etc. It provides the ground commander limited understanding of the effect airlift has on the combat power at his disposal and fails to distinguish the contributions of different fleets with similar MTM/D capabilities. MOEs that better portrayed forces moved and closure days had been refined in a previous study effort. That effort afforded operational commanders and other decision makers with a better understanding of how much equipment could be delivered in a given amount of time.

This latest effort attempted to go a step further and show the impact airlift has on the outcome of conflict. Based on a particular scenario, a combat task force can be developed. Then the airlift of the people and equipment, which comprise the task force, is modeled. This allows airlift to be defined in terms of

THIS

PAGE

IS

MISSING

IN

ORIGINAL

DOCUMENT

Force closure is scenario-specific, and does not provide a single aggregated value. But it begins to provide an operational perspective by looking at various airlift fleets or system capabilities. As mentioned before, it provides information on quantity of equipment or type of units that can be delivered in a given amount of time, or how much time it will take to deliver a given amount of equipment.

Combat effectiveness is also scenario-specific. Combat effectiveness provides the implication of airlift mission accomplishment. For airlift purposes, this measure may be most useful in determining future fleet composition, or determining the types of aircraft characteristics that need to be incorporated in the next generation of transporters. It would be useful in answering "why" additional airlift is needed.

Airlift's contribution to performance of the deployed forces can be quantified. MOEs other than the traditional MTM/D are available, i.e., Force Closure and Combat Effectiveness. The MOE needs to match the question. With the addition of conflict simulation, the airlift system can be analyzed within a total force perspective for its characteristics, performance, effectiveness and worth.

Other Issues

Airlift modeling, either as part of transportation and logistics models or as factors within combat models, needs to be rethought and refined. In the past, many of the models used a

factor of 5 percent airlift contribution for the total strategic deployment, and perhaps 10 percent for resupply, if resupply was even considered. These values need to be reviewed in light of airlift's performance during DS-DS, when airlift provided 15 percent of the dry cargo delivery, and 30 percent of resupply. (7:4) As discussed earlier, airlift is a system, and all elements of that system need to be reviewed so that the system itself can be better modeled, to provide a more useful analysis.

AFSAA recently studied pallet deployment and sustainment requirements, using MRS data and DS-DS lessons learned, in both the MRC-East and MRC-West scenarios. According to Air Force Regulation 76-13, pallet return cycle time is 25 days. Actual DS-DS experience was 90 days. Pallet attrition data based on DS-DS was 29 percent. The study also determined average pallet weights for various types of loads, i.e., unit equipment, sustainment and mail pallets. The study also established how many pallets are currently available and what one manufacturer indicated his production rates would be for replacements. (8:--)

The results of these types of studies will enable better analysis of the overall airlift system. The information they provide needs to be circulated and available to members throughout the strategic mobility community and wherever else they can be of benefit.

CHAPTER VII

CONCLUSION

Strategic airlift is an extremely significant element of US combat capability; not because it possesses firepower capability, but because it delivers and sustains it. Delivery capability is becoming ever more critical in today's environment of power projection instead of forward presence. When speed and flexibility are required and combat power must be delivered rapidly, hopefully to deter aggression but possibly to defend against it, airlift is the only mobility component capable of providing both that speed and flexibility. Airlift also has a critical part in many of the nontraditional roles of the military, to include humanitarian aid and noncombatant evacuation operations.

Airlift is more than just the number of aircraft it takes to deliver that capability. Airlift is a system. Based on changes to the scenarios and operations plans, capacity (MTM/D) must be recalibrated. What is important is to look at the entire system: the requirements and plans for intended operations; the airlift capability, both military and civilian; the capacity and constraints of enroute bases and final destinations including offloading requirements and redeployment; and, the consequences of improvements and modernization. The desired result is to reduce system inefficiencies and identify potential problem areas. Al-

though the focus of this paper has been on strategic airlift, this relook and refinement of the transportation system must be addressed by all the Services for the entire mobility triad, that is, airlift, sealift and prepositioning. While improving pieces of the mobility puzzle at the Service level is beneficial, efforts need to be made at higher levels, e.g., US Transportation Command, the Joint Chiefs of Staff, and the Office of the Secretary of Defense, to ensure the pieces fit together and complement each other.

In the end, what we are talking about is getting enough firepower on the ground, rapidly, to fight effectively while minimizing losses to personnel and equipment. We must reduce the risk for Americans sent into harm's way, and provide combat power and support when and where needed. We may have isolationist tendencies as a nation, but we cannot turn our backs on our global responsibilities and interests as the military superpower. If we are drawn into a situation that requires the potential use of force, then we must protect America's sons and daughters to the maximum extent possible. Improving the airlift system is one of the most important ways of ensuring the safety of US military personnel, our way of life, and our position in today's ever changing and unstable world.

BIBLIOGRAPHY

1. The Air Force and U.S. National Security: Global Reach—Global Power: A White Paper. Secretary of the Air Force, June 1990.

2. Bash, Brooks Lee, Major, USAF. CRAF: The Persian Gulf Experience and Implications for the Future. Naval War College, Newport, Rhode Island, 13 February 1992.

3. Bonnet, Mary T. "Airlift Measures of Effectiveness." Proceedings: 30th annual US Army Operations Research Symposium, 15 August 1991.

4. The C-17 in Desert Shield/Desert Storm: Update. Military Airlift Command, Office of Public Affairs, Scott AFB, IL, 13 March 1991.

5. Griffith, Ralph E., Maj, USA. Power Projection Through Airlift: An Army Perspective. Air Command and Staff College/EDC, Maxwell AFB, AL, April, 1988.

6. Humlie, Matthew S., Maj, USAF. Airlift Modernization. Air Force Studies and Analyses Agency, Washington, DC, March, 1992.

7. Lund, John and Berg, Ruth. Strategic Airlift in Operation Desert Shield and Desert Storm: An Assessment of Operational Efficiency. Rand, WORKING DRAFT, May 1992. (Corrections provided by Ruth Berg, 1 March 1993.)

8. Meyer, Eugene E. "Pallet Requirements based on Mobility Requirements Study (MRS) MRC-East and MRC-West and Desert Shield/Desert Storm Experience." Air Force Studies and Analyses Agency, Briefing, 22 June 1992.

9. Miller, Charles E., Lt Col, USAF (Research Fellow). Airlift Doctrine. Airpower Research Institute, Air University Press, Maxwell AFB, Al, March, 1988.

10. Mobility Requirements Study, Volume I, Executive Summary. Department of Defense, 23 January 1992.

11. Mobility Requirements Study, Volume II, Executive Summary, Version 1. Department of Defense, 31 July 1992.

12. Mobility Requirements Study, Volume II,Version 2. Department of Defense, 30 September 1992.